protech

True RMS Digital Multimeter

SPECIALIST

with Bluetooth®

LIFETIME WARRANTY

- 6000 DISPLAY COUNT
- CAT IV 600V
- IP67 RATED
- BACKLIT DISPLAY

INTRODUCTION

A stunning example of multimeter performance, with a rugged waterproof case to boot! Full auto ranging with high accuracy 6000 count display, as well as advanced math functions. All the usual features like data hold, temperature, capacitance, and a few not-so-common features like duty cycle measurement. Bluetooth® connectivity provides a host of advanced monitoring and data logging functionality without fuss.

WARNING

- Read, understand and follow Safety Rules and Operating Instructions in this manual before using this meter.
- The meter's safety features may not protect the user if not used in accordance with the manufacturer's instructions.
- Ensure that the test leads are fully seated in the input jacks and keep fingers away from the metal probe tips when taking measurements.
- Before changing functions using the selector switch, always disconnect the test leads from the circuit under test.
- Use only UL listed test leads with the proper safety category rating.
- Comply with all applicable safety codes. Use approved personal protective equipment when working near live electrical circuits - particularly with regard to arc-flash potential.
- Use caution on live circuits. Voltages above 30 V AC rms, 42 V ac peak, or 60 V dc pose a shock hazard.
- Do not use if the meter or test leads appear damaged.
- Verify operation before using meter by measuring a known live voltage.
- Do not use the meter in wet or damp environments or during electrical storms.
- Do not use the meter or near explosive vapors, dust or gasses.
- Do not use the meter if it operates incorrectly. Protection may be compromised.
- Do not operate meter while Low Battery warning is on. Replace batteries immediately.
- Do not apply voltage or current that exceeds the meter's maximum rated input limits.

INPUT LIMITS

Function	Maximum Input
Voltage AC or DC	1000V AC RMS/1000V DC
Low Z	600V AC RMS/600V DC
µA, mA Current AC/DC	800mA 1000V fast acting fuse
10A Current AC or DC	10A 1000V fast acting fuse (10A for 30 seconds max. every 15 minutes)
Resistance, Continuity, Diode Test, Capacitance, Frequency, Duty Cycle	600V AC RMS/600V DC
Temperature	600V AC RMS/600V DC

GENERAL SPECIFICATIONS

Display	6000 Count
Measurement Category	Cat IV 600V / Cat III 1000V
Basic VDC Accuracy	0.500%
DC Voltage	600mV, 6V, 60V, 600V, 1000V (± 0.8%)
AC Voltage	6V, 60V, 600V, 1000V (± 1.0%)
DC Current	600µA, 6000µA, 60mA, 600mA, 10A (± 1.0%)
AC Current	600µA, 6000µA, 60mA, 600mA, 10A (± 1.0%)
Resistance	600Ω, 6kΩ, 60kΩ, 600kΩ. 6MΩ, 60MΩ (± 1.5%)
Capacitance	60nF, 600nF, 6µF, 60µF, 600µF, 6000µF (± 3.0%)
Frequency	0.001Hz, 1kHz, 10kHz (± 1.0%)
Temperature	-20°C to 760°C / -4°F to 1400°F (± 1.0%)
AC Rectification	True RMS
Input Impedance	10M
Fuse	F10A 1000V
Dimensions	170(H) x 75(W) x 48(D)mm
Insulations	Class 2, Double Insulation
Enclosure	Double Molded, IP67 waterproof and dustproof
Diode Test	Test current 1mA typical, open circuit voltage 3V typical
Continuity Test	Audible signal if the resistance is approx. 30Ω or less
Low Battery Indication	 is displayed
Over Range Indication	“OL:” is displayed
Polarity	Minus symbol “-“ is displayed for negative polarity
Measurement Rate	3 readings per second, nominal
Auto. Power Off	After approx. 15 minutes of inactivity
Low Z	Approx. 3kΩ input impedance
AC Bandwidth	50 to 1000Hz
Batteries	4 x AAA 1.5V batteries
Fuses	800mA 1000V (6.3 x 32mm) fast blow/10A 1000V (10 x 38mm) fast blow
Safety	Complies with UL 61010-1 v.3 for measurement Category IV 600V and Category lll 1000V, Pollution Degree 2

SAFETY SYMBOLS

Potential danger. Indicates the user must refer to the manual for important safety information.

Indicates hazardous voltages may be present.

Equipment is protected by double or reinforced insulation.

MAX 1000

Indicates the terminal(s) so marked must not be connected to a circuit where the voltage with respect to earth ground exceeds the maximum safety rating of the meter.

SAFETY CATEGORY RATINGS

Category Rating	Description	Typical Applications
CAT II	Single phase receptacles and connected loads	• Household appliances, power tools • Outlets more than 30ft (10m) from a Cat III source • Outlets more than 60ft (20m) from a Cat IV source
CAT III	Three phase circuits and single phase lighting circuits in commercial buildings	• Equipment in fixed installations such as 3-phase motors, switchgear and distribution panels • Lighting circuits in commercial buildings • Feeder lines in industrial plants • Any device or branch circuit that is close to a Cat III source
CAT IV	Connection point to utility power and outdoor conductors	• Primary distribution panels • Overhead or underground lines to detached buildings • Incoming service entrance from utility • Outdoor pumps

The measurement category (CAT) rating and voltage rating is determined by a combination of the meter, test probes and any accessories connected to the meter and test probes. The combination rating is the LOWEST of any individual component.

MAINTENANCE

This Multimeter is designed to provide years of dependable service, if the following care instructions are performed:

1. KEEP THE METER DRY. If it gets wet, wipe it off.
2. USE AND STORE THE METER IN NORMAL TEMPERATURES. Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.
3. HANDLE THE METER GENTLY AND CAREFULLY. Dropping it can damage the electronic parts or the case.
4. KEEP THE METER CLEAN. Wipe the case occasionally with a damp cloth. DO NOT use chemicals, cleaning solvents, or detergents.
5. USE ONLY FRESH BATTERIES OF THE RECOMMENDED SIZE AND TYPE. Remove old or weak batteries so they do not leak and damage the unit.
6. IF THE METER IS TO BE STORED FOR A LONG PERIOD OF TIME, the batteries should be removed to prevent damage to the unit.

METER KEY/LCD GUIDE

V	Volts
A	Amperes
~	Alternating Current
⎓	Direct Current
-	Minus Sign
Ω	Ohms
	Continuity
	Diode Test
F	Farads (Capacitance)
Hz	Hertz (Frequency)
%	Percent (Duty Ratio)
°F	Degrees Fahrenheit
°C	Degrees Centigrade
n	nano (10^{-9})
μ	micro (10^{-6})
m	milli (10^{-3})
k	kilo (10^{3})
M	mega (10^{6})
OL	Overload
	Auto Power Off
	Low Battery
AUTO	Autoranging
HOLD	Display Hold
LOZ	Low Impedance
MAX/MIN/AVG	Maximum/Minimum/Average
Peak	Peak Hold
REL	Relative
AC+DC	AC+DC Voltage
	Bluetooth®

RANGE BUTTON

The Autorange mode automatically selects the proper range for the measurement being made and is generally the best mode for most applications. Range can be manually selected for situations that require it.

Note: The range button does not work on AC A Frequency, Duty Cycle, or Temperature.

MODE/BLUETOOTH® BUTTON

Momentarily press the MODE button to select AC or DC, Frequency or Duty Cycle, Resistance, Continuity or Diode Test and °C or °F.
Bluetooth® allows readings to be displayed and stored on mobile devices. To activate Bluetooth® , press and hold the MODE button until the " " symbol appears on the LCD display. Bluetooth® should be disabled when not connected to a mobile device in order to conserve battery power. To turn off Bluetooth®, press and hold the MODE button until the " " symbol no longer appears on the display.

Visit the following app website for Meterbox Pro mobile APP downloads.
Android Devices:
https://play.google.com/store/apps/details?id=com.cem.supermeterbox&hl=en_US
IOS Devices:
https://itunes.apple.com/au/app/meterbox-pro/id1231364276?mt=8

REL/AC + DC BUTTON

The RELATIVE function zeros out the reading on the display and stores it as a reference. Subsequent readings will be displayed as the relative difference between the actual measurement and the stored reference value. To activate, momentarily press the REL/AC + DC button. The "REL" indicator will appear on the LCD display along with the relative reading. Momentarily press the REL/HZ button again to return to normal operation.

Note: The meter does not Autorange when the Relative mode is active. The display will read OL if the difference exceeds the range. When this occurs, exit REL and use the RANGE button to select a higher range. REL does not work on Frequency, Duty Cycle, or Temperature.

The AC + DC function measures both the AC and DC components to derive the effective RMS (AC + DC) value. The AC + DC mode is typically used when measuring voltage on unfiltered rectifier circuits. To activate, press and hold the REL/AC + DC button until "AC + DC" appears on the LCD display.

Note: AC + DC can only be accessed when the meter is set to AC or DC voltage.

MAX/MIN/AVG BUTTON

1. Momentarily press the MAX/MIN/AVG button to activate the MAX/MIN/Average mode. “MAX” will appear on the LCD display and the meter will display and hold the highest reading. The meter will update the reading when a higher “max” occurs.
2. Momentarily press the MAX/MIN/AVG button again to view the lowest reading. “MIN” will appear on the LCD display and the meter will display and hold the lowest reading. The meter will update the reading when a lower “min” occurs.
3. Momentarily press the MAX/MIN/AVG button once more to view the average reading. “AVG” will appear on the LCD display and the meter will display the running average. The meter will update the reading when the average value changes.
4. Press and hold the MAX/MIN/AVG button to end MAX/MIN/Average and return to normal operation.

Note: The meter does not Autorange when the MAX/MIN/AVG mode is active. The display will read OL if the range is exceeded. When this occurs, exit MAX/MIN/AVG and use the RANGE button to select a higher range. MAX/MIN/AVG does not work on Frequency, Duty Cycle or Temperature.

BACKLIGHT/HOLD BUTTON

To freeze the reading on the LCD display, momentarily press the HOLD button. The “HOLD” indicator will be displayed while the reading is being held. Momentarily press the HOLD button again to exit HOLD and return to normal operation.
To turn the backlight on, press and hold the HOLD button until the backlight turns on. To turn the backlight off, press and hold the HOLD button until the backlight turns off.

PEAK/FLASHLIGHT BUTTON

The PEAK function is accessible when measuring AC Voltage or Current. It captures and displays the highest positive peak and the highest negative peak of the AC waveform.

1. Momentarily press the PEAK button to view the highest positive peak. Peak MAX will appear on the LCD display and meter will display and hold the highest reading. The meter will update the reading when a higher positive peak occurs.
2. Momentarily press the PEAK button a second time to view the highest negative peak. Peak MIN will appear on the LCD display and the meter will display and hold the highest reading. The meter will update the reading when a higher negative peak occurs.
3. Momentarily press the PEAK button again to exit PEAK and return to normal operation.

To turn the flashlight on, press and hold the PEAK button until the flashlight turns on. To turn the flashlight off, press and hold the PEAK button until the flashlight turns off.

AC/DC VOLTAGE MEASUREMENTS

WARNING: Observe all safety precautions when working on live voltages.

1. Set the rotatory function switch to the V ⎓ HZ% position.
2. To select AC or DC, momentarily press the MODE button until the AC "~" or DC "⎓" symbol appears on the LCD display.
3. Insert the black test lead into the COM input jack and the red test lead into the V input jack.
4. Touch the test lead probes to the circuit under test. If measuring DC voltage, touch the red test lead to the positive side of the circuit and the black test lead to the negative side of the circuit.
5. Read the voltage on the LCD display,

FREQUENCY AND % DUTY CYCLE MEASUREMENTS

WARNING: Observe all safety precautions when working on live voltages. Do not measure frequency or duty cycle on circuits that exceed 600V.

1. Set the rotatory function switch to the V ⎓ HZ% position.
2. To select Frequency or % Duty Cycle, momentarily press the MODE button until the "Hz" or "%" symbol appears on the LCD display
3. Insert the black test lead into the COM input jack and the red test lead into the V input jack.
4. Touch the test lead probes to the circuit under test.
5. Read the frequency or % duty cycle on the LCD display.

LOW Z VOLTAGE MEASUREMENTS

WARNING: Observe all safety precautions when working on live voltages. Do not connect to circuits that exceed 600V AC/DC when the meter is set to Low Z.

Low Z is used to check for "ghost" voltage. Ghost voltages are present when non-powered wires are in close proximity to wires powered wires. Capacitive coupling between wires make it appear that non-powered wires are connected to a real source of voltage. The Low Z setting places a load on the circuit, which greatly reduces the voltage reading when connected to ghost voltage.

1. Set the rotary function switch to the Low Z position.
2. Momentarily press the MODE button to select AC or DC voltage. The AC "~" or DC " " symbol will appear on the LCD display.
3. Insert the black test lead into the COM input jack and the red test lead into the V input jack. If measuring DC voltage, touch the red test lead to the positive side of the circuit and the black test lead to the negative side of the circuit.
4. Touch the test leads to the circuit under test.
5. Read the voltage on the LCD display.

AC/DC CURRENT MEASUREMENTS

WARNING: Observe all safety precautions when working on live circuits. Do not measure current on circuits that exceed 1000V. Measurements in the 10A range should be limited to 30 seconds maximum every 15 minutes.

1. Insert the black test lead into the negative COM input jack.
2. For current measurements up to 10A, set the rotary function switch to the 10A position and insert the red test lead into the 10A input jack.
3. For current measurements up to 600mA, set the rotary function switch to the mA position and insert the red test lead into the µA mA input jack.
4. For current measurements up to 6000µA, set the rotary function switch to the µA position and insert the red test lead into the µA mA input jack.
5. Momentarily press the MODE button to select AC or DC current. The AC "~" or DC "⎓" symbol will appear on the LCD display.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Touch the test lead probes in series with the circuit being measured. For DC current, touch the red probe to the positive side of the circuit and touch the black probe to the negative side of the circuit.
8. Apply power to the circuit.
9. Read the current on the LCD display.

RESISTANCE MEASUREMENTS

WARNING: Never test resistance on a live circuit.

1. Set the rotary function switch to the Ω position.
2. Momentarily press the MODE button until the Ω symbol appears on the LCD display.
3. Insert the black test lead into the COM input jack and the red test lead into the Ω input jack.
4. Touch the test lead probes to the component under test. If the component is installed in a circuit, it is best to disconnect one side before testing to eliminate interference with other devices.
5. Read the resistance in on the LCD display.

CONTINUITY MEASUREMENTS

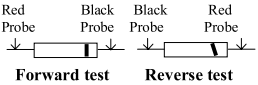
WARNING: Never test continuity on a live circuit.

1. Set the rotary function switch to the Ω position.
2. Momentarily press the MODE button until the symbol appears on the LCD display.
3. Insert the black test lead into the COM input jack and the red test lead into the Ω input jack.
4. Touch the test lead probes to the device or wire under test.
5. A beeper will sound if the resistance is approximately 30Ω or less and the resistance value will be shown on the LCD display.

DIODE TEST

WARNING: Never test diodes in a live circuit.

1. Set the rotary function switch to the Ω position.
2. Momentarily press the MODE button until the symbol appears on the LCD display.
3. Insert the black test lead into the COM input jack and the red test lead into the Ω input jack.
4. Touch the test lead probes to the diode under test.
5. Forward voltage will indicate 0.4 to 0.7 on the display. Reverse voltage will indicate “OL”. Shorted devices will indicate near 0 and an open device will indicate “OL” in both polarities.



CAPACITANCE MEASUREMENTS

WARNING: Safely discharge capacitors before taking capacitance measurements.

1. Set the rotary function switch to the position.
2. Insert the black test lead into the COM input jack and the red test lead into the input jack.
3. Touch the test lead probes to the capacitor under test.
4. Read the capacitance value on the LCD display. It may take up to a minute to get a stable reading on large capacitors.

TEMPERATURE MEASUREMENTS

WARNING: Do not touch the temperature probe to live circuits.

1. Set the rotary function switch to the °F °C position.
2. Momentarily press the MODE button to select readings in °F or °C.
3. Connect the Temperature Probe to the Banana Plug Adapter. Note the – and + markings on the adapter. Connect the adapter to the meter, making sure the – side goes into the COM input jack and the + side goes into the °F °C input jack.
4. Touch the tip of the Temperature Probe to the object being measured. Keep the probe touching the object until the reading stabilizes (about 30 sec).
5. Read the temperature on the LCD display.

BATTERY REPLACEMENT

WARNING: To avoid electric shock, remove the test leads from the meter before removing the battery/fuse cover.

1. Lift up the tilt stand.
2. Loosen the one Phillips screw on the battery/fuse cover.
3. Remove the battery/fuse cover.
4. Replace the batteries with four AAA batteries.
5. Observe proper polarity as shown inside battery compartment.
6. Install the battery/fuse cover and tighten the screw.

WARNING: To avoid electric shock, do not operate meter until the battery/fuse cover are securely fastened to the meter.

FUSE REPLACEMENT

WARNING: To avoid electric shock, remove the test leads from the meter before removing the battery/fuse cover.

1. Lift up the tilt stand.
2. Loosen the one Phillips screw on the battery/fuse cover.
3. Remove the battery/fuse cover.
4. Gently remove fuse and install new fuse into the holder.
5. Always use a UL recognized fuse of the proper size and value:
   800mA/1000V (6.3 x 32mm) fast blow for the µA/mA ranges and
   10A/1000V (10 x 38mm) fast blow for the 10A range.
6. Install the battery/fuse cover and tighten the screw.

WARNING: To avoid electric shock, do not operate meter until the battery/fuse cover is securely fastened to the meter.

PRODUCT GUIDE

1. LCD Display
2. REL/AC+DC Button
3. RANGE Button
4. MODE Button
5. Rotary Function Switch
6. 10A Input Jack
7. µA, mA Input Jack
8. COM Input Jack
9. V/Ω/DIODE/CAP/Hz%/°C °F Input Jack
10. Backlight/HOLD Button
11. PEAK/Flashlight Button
12. MAX/MIN/AVG Button
13. Auto Backlight
14. Flashlight

SPECIFICATIONS

Accuracy is stated at 65°F to 83°F (18°C to 28°C), less than 70% relative humidity.

Function	Range	Resolution	Accuracy ± (% of reading + digits)
AC Voltage	6.000V	1mV	±(1.0% + 5)
	60.00V	10mV	
	600.0V	0.1V	
	1000V	1V	±(1.2% + 5)

Input Protection: 1000V AC RMS or 1000V DC
Input Impedance: 10MΩ
AC voltage bandwidth: 50 to 1000Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
AC+DC Voltage	6.000V	1mV	±(1.5% + 20)
	60.00V	10mV	
	600.0V	0.1V	
	1000V	1V	±(1.5% + 5)

Input Protection: 1000V AC RMS or 1000V DC
Input Impedance: 10MΩ
AC voltage bandwidth: 50 to 1000Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
DC Voltage	600.0mV	0.1mV	±(0.9% + 8)
	6.000V	1mV	±(0.9% + 5)
	60.00V	1mV	
	600.0V	0.1V	
	1000V	1V	±(1.0% + 3)

Input Protection: 1000V AC RMS or 1000V DC
Input Impedance: 10MΩ

Function	Range	Resolution	Accuracy ± (% of reading + digits)
AC/DC Voltage (LOZ)	6.000V	1mV	±(3.0% + 30)
	60.00V	10mV	
	600.0V	0.1V	
	1000V	1V	±(3.0% + 5)

Input Protection: 600V AC RMS or 600V DC
Input Impedance: Approx. 3kΩ
AC voltage bandwidth: 50 to 1000Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Frequency	9.999Hz	0.001Hz	±(1.0% + 5)
	99.99Hz	0.01Hz	
	999.9Hz	0.1Hz	
	9.999kHz	1Hz	

Input Protection: 600V AC RMS or 600V DC
Sensitivity: >8V RMS

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Duty Cycle	1.0% to 99.9%	0.1%	±(1.2% + 2)

Input Protection: 600V DC or 600V AC RMS
Pulse Width: 0.1 to 100mS
Frequency Range: 5Hz to 10kHz
Sensitivity: >8V RMS

Function	Range	Resolution	Accuracy ± (% of reading + digits)
AC Current	600.0µA	0.1µA	±(1.0% + 3)
	6000µA	1µA	
	60.00mA	10µA	
	600.0mA	0.1mA	
	10.00A	10mA	±(2.0% + 5)

Overload Protection: µA/mA ranges: 800mA/1000V Fuse
10A range: 10A/1000V Fuse
AC current bandwidth: 50 to 400Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
DC Current	600.0µA	0.1µA	±(1.0% + 3)
	6000µA	1µA	
	60.00mA	10µA	
	600.0mA	0.1mA	
	10.00A	10mA	±(1.2% + 3)

Overload Protection: µA/mA ranges: 800mA/1000V Fuse
10A range: 10A/1000V Fuse

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Resistance	600.0Ω	0.1Ω	±(1.5% + 5)
	6.000kΩ	1Ω	
	60.00kΩ	10Ω	
	600.0kΩ	100Ω	
	6.000MΩ	1kΩ	
	60.00mΩ	10kΩ	±(2.0% + 20)

Input Protection: 600V DC or 600V AC RMS

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Capacitance	60.00nF	10pF	±(5.0% + 35)
	600.0nF	100pF	±(3.0% + 5)
	6.000µF	0.001µF	
	60.00µF	0.01µF	
	600.0µF	01.µF	
	6000µF	1µF	±(5.0% + 5)

Input Protection: 600V AC RMS or 600V DC

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Temperature	-4°F to 1400°F	0.1~1°F	±(1.0% + 9°F)
	-20°C to 760°C	0.1°~1°C	±(1.0% + 5°C)

Input Protection: 600V AC RMS or 600V DC

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